Successful Methods

Construction - Road Making - Engineering - Industrial - Mining

Night Work in the High Alps

Vol. 5. May 1923 No. 5

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Successful Methods

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The Inevitable

POLITICS have made a mess of this year's road building program in several of the States which have been in the front rank of the better highway movement of the country. In some States the upheaval is merely due to a change of party control. In others the present outlook might appear to indicate a permanent retrenchment policy. There also has been a lot of loose talk about the bad economics of building durable surfaces on even the trunk line highways of several densely populated States.

All this was inevitable. Our highway program has become the biggest constructive work the nation has ever undertaken. On the whole it has been a clean job—remarkably clean. Politics have been unable to dig up crooked work anywhere. The opposition to the highway movement has received its main support on the question of the expediency of spending so much money now for roads to carry a traffic that the wise among them confess seems to have no limits.

That strong support was forthcoming last year for any plan which would appear to reduce taxes was natural. But the swing in a few States to those opposed to highway building was nothing more than a swing. Even in some of these States, the opposition argued merely for slowing down on new work for a while; none tried to stop highway building altogether.

To those living in the States where highway work has been more or less checked temporarily, the outlook may appear serious. Taking the country as a whole, however, the setbacks are purely local. The demand for more and more roads apparently must be met. Road building on a tremendous scale for several years seems just as inevitable as is the hindrance from politics which the movement lately has met here and there.

"Pioneers, O Pioneers"

OLD-TIME dirt movers have read with a bit of tight feeling in the throat that a 330-mile railroad is to be built this season from the Wyoming oil fields up to a main-line connection in Montana. It is many a day since that amount of new line has been awarded in an entire year. And how things have changed meanwhile! But with all the change, the same old pioneer spirit that literally fought the trunk lines across the plains and on to the Coast will be necessary to put this big job through in a single season.

The tractor and the motor truck will take the place of many a mule on this contract. The oxen of the old days will show up only on the mess table. Even the atmosphere of the mess table itself and of the camp, with all their present day luxuries, will make the old camp life seem extremely primitive. News of the world probably will come in every evening by radio. The old isolation, with its compensations to men who are the real dirt movers, will be gone.

With all these and many other just as sweeping changes from the old-time railroad construction camps, the pioneer spirit will be there just the same. Men will go ahead and do the job, regardless of the heat and the storms and the sweat. They will go against the obstacles they meet with the pioneer spirit that welded out of the Mississippi Valley the backbone of the greatest nation of all time.

Few people today realize what the pioneer spirit has done and can still do. Some of us, who have seen something of pioneering, or whose parents were in the great treks that drove the opening wedges into the West, are thankful that such a spirit still lives among us. There can be no full expression of it, except in the results it accomplishes. But Hartlett Burr Alexander has in these lines struck a key on it that many will understand:

Pioneers, O Pioneers!
Bring the wagon, yoke the steers,
Cast behind all doubts and fears!
Forward, through the waiting years!
Pioneers, O Pioneers!

'Tis your toil shall break the road;
'Tis your backs shall bear the load;
'Tis your souls must feel the goad!

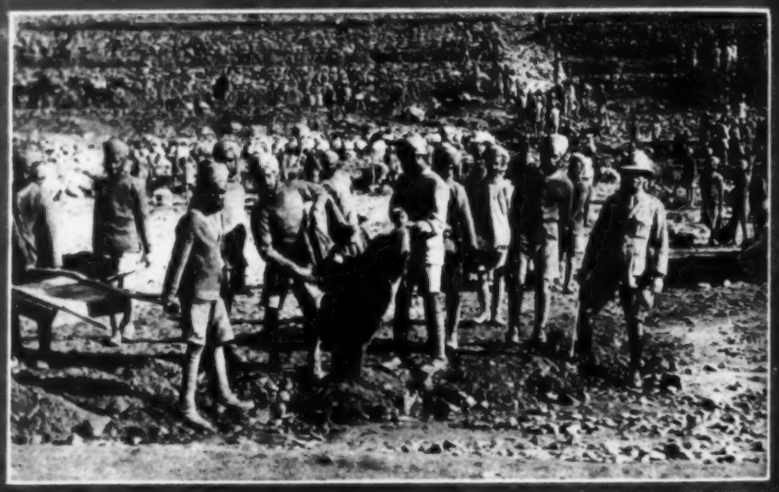
Where ye sow shall others reap;
Others laugh where ye must weep;
But your deathless souls shall keep
Vigil through the waiting years,
Pioneers, O Pioneers!

Snap! Crack!
Thud and thwack!
'Tis the chanty of the Plains—
Never, never, turn we back!
O'er the trails that rise and dip,
To the whistling of the whip
And the clanking of the chains—
Snap! Crack!
Thud and thwack!
Sing the chanty of the Plains—
Never, never, turn we back!

Hand Labor in India

1—Road construction in Waziristan on the Northwest border of India. The only machinery in evidence in this highway construction expedition organized by the British, are the picks and shovels, unless the camels in the background can be classified as machines. © *International.*

2—It evidently takes a whole native tribe to build roads in India. A careful inspection of this photograph will show men more or less hard at work scattered about the landscape. The material-handling equipment shown seems to be of the home-made variety. © *International.*

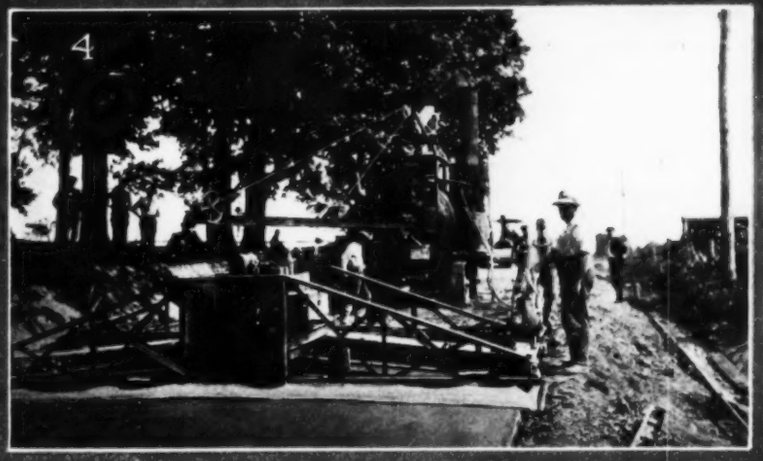


3 — This photograph shows the road building expedition on the march. Not all of the men are laborers as it is necessary to provide an armed escort which stands guard and fights off marauders while the work is going on. The section through which the road is being built is infested by outlaw bands.

© *International.*

Machines in America

4—In the United States this sort of machinery reduces to a minimum the hand labor required on a road building job. This photograph shows a paver and finishing machine with a roller in the background.



5 — Another labor-saver in highway construction is the proportioning plant shown in this photograph, which loads batch boxes which are then transported to the paver over narrow-gage track.

6 — The machine at the right is employed in loading stone into three-wheeled dump trucks which operate on the subgrade between the pile of aggregates and the mixer. The photograph was taken on an Illinois job.

BUILDING A DAM IN THE ALPS

Modern Methods and Machinery Play Important Part in Hydro-Electric Development in Switzerland

By L. A. Nutter

TO provide 60,000 hp. for the further electrification of the Swiss Federal Railways the Barberine dam is being built at the headwaters of the Barberine, which will have a storage capacity of 9,500,000,000 gal. of water. A tunnel 7874 ft. long and two high pressure pipe lines about 4 ft. in diameter and ⅜ in. thick carry the water to the turbines at Chatelard.

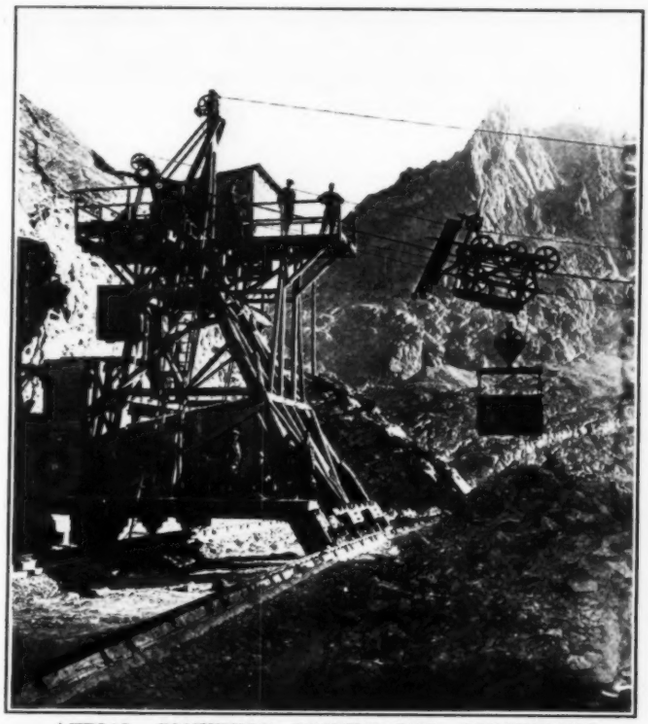
TWO OF THE MIXERS AND CHUTE SECTIONS

The Barberine dam is the gravity section and will contain 275,000 cu. yd. of cyclopean concrete. The front of the dam and the upper 108 ft. of the back will be faced with quarry-faced masonry.

On account of the altitude the working season is limited to about 100 days. To take full advantage of this period the contractors have installed a complete and modern mechanical system for handling material and equipment and for mixing and placing concrete. The ruggedness of this mountainous country can be appreciated by the fact that all building materials for the modern camp at Emossou were packed by Swiss guides over the mountains. The camp contains a thoroughly equipped hospital, large steam kitchen, drying rooms with steam heat and electric light throughout.

GENERAL VIEW OF WORK SHOWING CHUTING PLANT BY WHICH WHOLE AREA OF DAM IS COVERED

The cement is received sacked in carload lots at the railroad station of Chatelard. It is unloaded directly to an aerial conveyor and transported by aerial a distance of 1.9 miles to the dam. This aerial has a capacity of 8 tons per hour with a normal load of 770 lb. per bucket at a speed of 6.39 ft. per second. The maximum distance between supports is 2100 ft. From Chatelard to Emossou it is operated by 65 hp. motor and by a 30 hp. motor from Emossou to the dam. Here the cement is unsacked and discharged to a hopper, the bottom of which is provided with a screw conveyor carrying the cement to the bin. This bin is equipped with a double screw conveyor which discharges the cement to 3 automatic weighing machines. If a weighing machine is already filled the screw passes the cement to the second or third weighing machine and any excess cement is picked up by the second screw conveyor which carries the cement back toward the cement bin, filling any of the weighing machines which may have been emptied. This system has proved very correct in weight and altogether satisfactory in operation. The sand and rock are measured in a batch hopper which in turn discharges to the mixer hopper.



AERIAL CONVEYOR SYSTEM FOR DELIVERING MATERIAL TO MIXERS

Sand and gravel are obtained from a large glacial deposit, the loading being taken care of with 2 bucket-type excavators. These excavators load to V-dump cars of 1-yd. capacity which are handled by locomotive to a track hopper. A belt conveyor carries the material to a washing and screening plant of a capacity of 915 cu. yd. per 10 hours, with a gyratory crusher to take care of the oversize (approximately 20 per cent). The bins at the washing and screening plant

THE LOCATION OF THE DAM WHERE SNOW FALLS NEARLY EVERY MONTH OF THE YEAR

have a storage capacity of 457 cu. yd. and discharge to an aerial conveyor system with a normal carrying capacity of 108 tons per hour at a speed of 7.37 ft. per second. This aerial is 3150 ft. in length, operated with a 60-hp. motor and delivers the material to the bins at the mixing plant. These bins hold 1308 cu. yd. of sand and gravel and 39 cu. yd. of cement.

A complete concrete mixing and chuting plant has been installed consisting of three 1-yd. mixers, two 1-yd. standard steel towers 240 ft. high, an anchor tower and two rehoist towers. Concrete is poured through standard 14-in. 12-gage chute sections and distributed through counterweighed chute sections arranged so that the entire area of the dam is covered without displacing the chute lines. All chute sections were relined with ⅛-in. reliners and 23,544 cu. yd. of concrete was handled through one chute line before reliners were worn through. For the coming season's work reliners of ¼-in. thickness have been provided in order to obtain a full season's pouring without replacing the reliners.

A cable crane with one end movable and having a span of 1345 ft. was used for a large part of the excavation and installing the machinery and concrete facing equipment. It now serves for placing th plumb stones and for transporting the quarry facing rock which is received by inclined railway at the fixed end of the cable crane.

The crane is rated at 6 tons at a speed of 45 ft. per minute and is operated with an 80-hp. motor. Two 3-ton steel guy derricks place plumb stones in the radius they serve.

For sealing the rock fissures a water pressure system for injecting concrete under pressure is employed. The difficulties which the contractors have had to overcome have been enormous, particularly due to the inaccessibility of the region, the ruggedness of the country and the high altitude, with the consequent large and ever-present amount of snow. To hasten the commencement of last season's work the contractors removed more than 15,600 cu. yd. of sno

The contractors are Messrs. Martin & Ba of Lausanne, with Mr. Ruttiman, engineer on the j

The concrete placing equipment as well as the sa and gravel washing, screening and crushing pla are American installations.

CLEVIS USED FOR WHEELER HITCH

A HITCH for wheelers and wagons to be used with tractors has been developed on the job by the G. C. Cleaver Co., contractors of Punxsutawney, Pa. A long series of experiments were tried out before the hitch illustrated in the photograph below was developed. As may be seen, a clevis is used to hook from the wheeler tongue to the draw-bar cap of the tractor, thus eliminating the danger of breaking the draw-bar cap off when two pieces of solid metal, o above and one below the draw-bar with a bolt are used. The hitch illustrated is especially good on turn around movements.

FIFTEEN YEARS OLD AND STILL ON THE JOB

Ancient Elevating Grader Shows That It Pays to Buy Good Machinery and Then Take Care of It

SUCCESSFUL METHODS for March, A. W. Muir, Superintendent of Maintenance, New Jersey State Highway Commission, describes in an interesting way successful use of an elevating grader in road maintenance for removing windrows of "dead material" from the roads. He refers particularly to the tendency of the material to slip back on the belt, for which reason it was desirable to keep the elevator at as low an angle as possible.

The experience of H. G. Hughes, who is engaged in road work at Dallas, Texas, may be of value in this connection. Mr. Hughes is grading roads through a new sub-division which is being laid out elaborately to attract wealthy home builders. He is doing this work with an ancient elevating grader of 1908 vintage. He paid $300 for this machine 10 years ago and at that time it had been in operation 5 years. It pays to buy good machinery and then take care of it.

Much of his grading is in rock; he moved 15,000 cu. yd. of rock last season in this same work with that venerable tool. He, too, had trouble with the material slipping back on the belt, and to overcome the difficulty he installed an extra long 21-ft. carrier, which enables him to operate the carrier at a low angle and move more material with less power. He pulls the machine with a tractor and when operating in rock drags a rooter plow back of the grader, loosening up material for the next round. Rocks which are too large to be handled by the machine are placed on one side to be used in the sub-base. The others are used in filling low places and subsequently are covered with earth.

THE PHOTOGRAPHS ON THIS PAGE SHOW THE ELEVATING GRADER EQUIPPED WITH AN EXTRA LONG CARRIER TO PREVENT MATERIAL FROM SLIPPING BACK ON BELT

ERIE CANAL BECOMES A SUBWAY

Unusual Construction Methods Utilized in Transformation Process at Rochester, N. Y.

WHEN the Erie Canal was built in the early part of the last century, it ran through the heart of the city of Rochester, N. Y. The opening of the new State Barge Canal resulted in the abandonment of the old Erie Canal, and it was purchased from the State by the city, as it was realized that it could be utilized in one way or another to relieve the congestion of traffic in the business district.

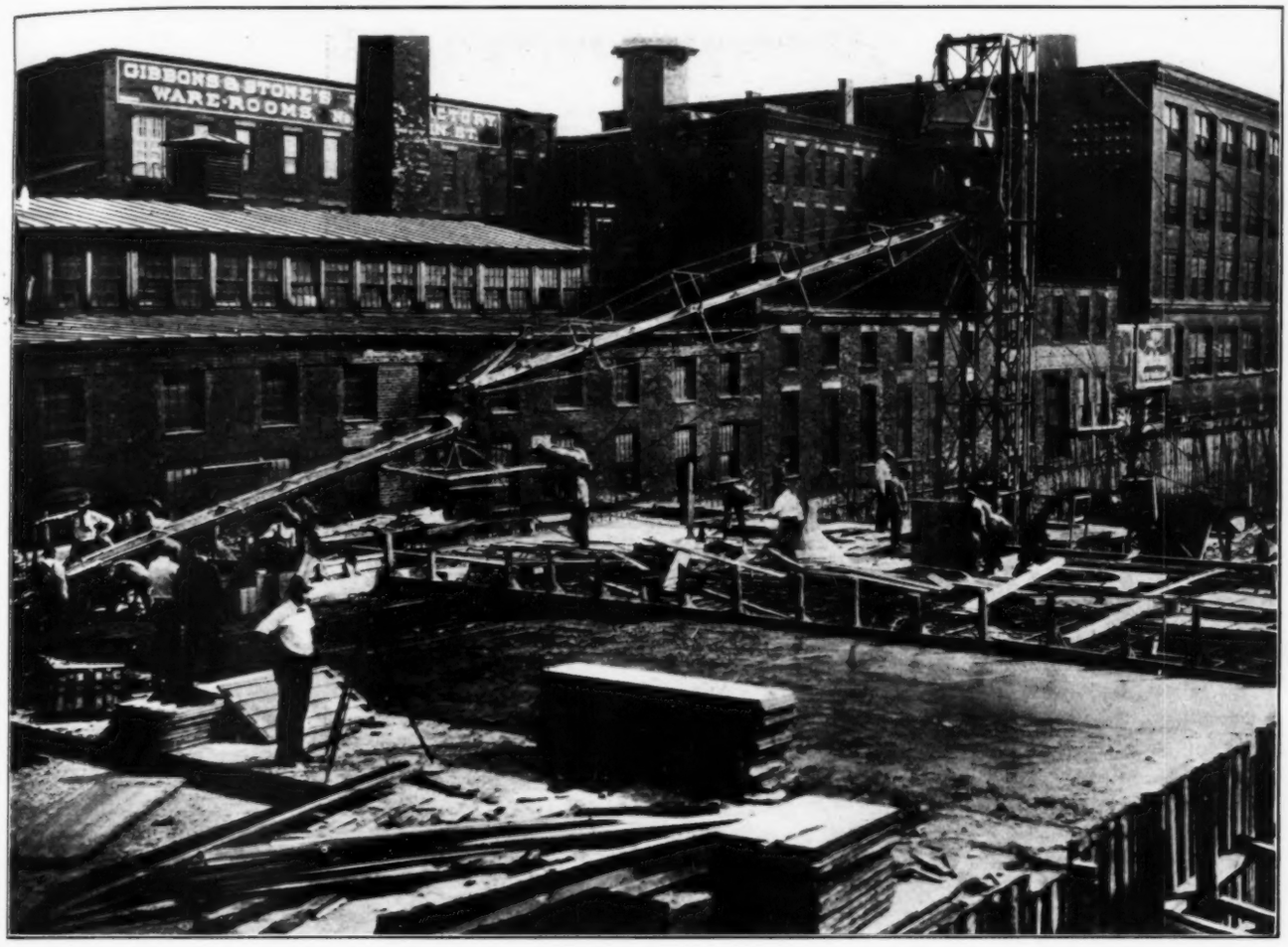
After considering several plans for utilizing the old canal, it was decided to build a subway with a roadway on top. This subway is to be about 3500 ft. in length and will provide space for four tracks. In addition to the part of the canal used for the subway, about 13 miles of it are to be used as an open cut for trolley tracks. The interurban cars entering the city on certain lines will be diverted to the tracks in the old canal bed and will then run directly through the subway, thereby avoiding grade crossings. In addition, two of the tracks in the subway will be used as a connecting railway for freight traffic between some of the railroads which have stations in different parts of the city. These railroad cars, of course, will be handled by electric locomotives while passing through the subway.

The contract for the subway was let to Scott Bros. of Rome, N. Y., and work was begun in May, 1922. Last season the work proceeded at the rate of about 75 ft. per week, but certain changes in methods are expected to insure a progress of about 120 ft. per week this year so that the entire job will be finished by Nov. 1, 1923.

In order to provide room for the subway, the canal bed had to be deepened about 10 ft. which involved rock excavation for practically the entire distance. The subway structure itself varies in width from 54 to 91 ft. The average thickness of the top slab on which the roadway will run is 17 in. and this slab is supported by concrete side walls and also by concrete columns for the greater part of the subway length. The columns are 24 ft. apart in two rows.

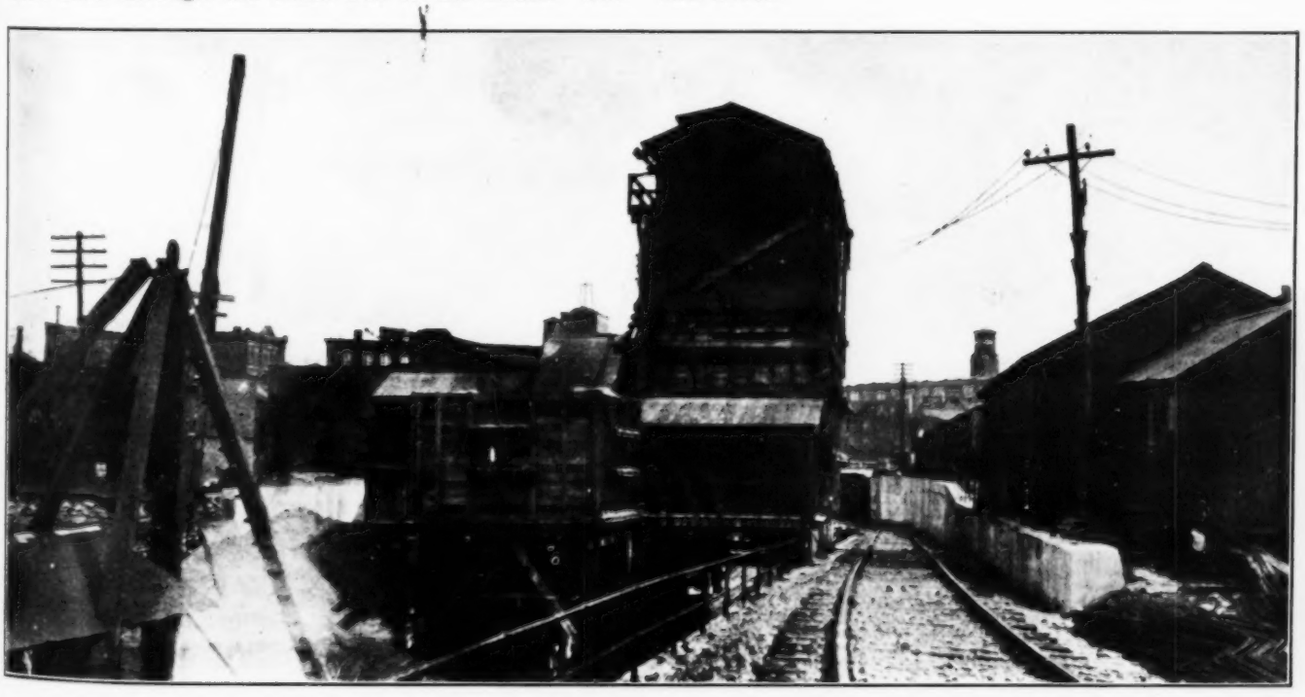
In planning the work, Scott Bros. decided to utilize rather unusual methods. The rock from which the gravel for the concrete was to be obtained was all in the bed of the canal. A crusher, therefore, was built at the west end of the subway. As fast as the rock was blasted out it was picked up with a steam shovel, loaded on trucks and sent back through the bed of the canal to the crusher. After being crushed, it

A GENERAL VIEW OF THE WORK, SHOWING MIXER, NARROW GAGE TRACK AND ROADWAY FOR MOTOR TRUCKS SIDE BY SIDE IN THE BED OF THE FAMOUS OLD CANAL



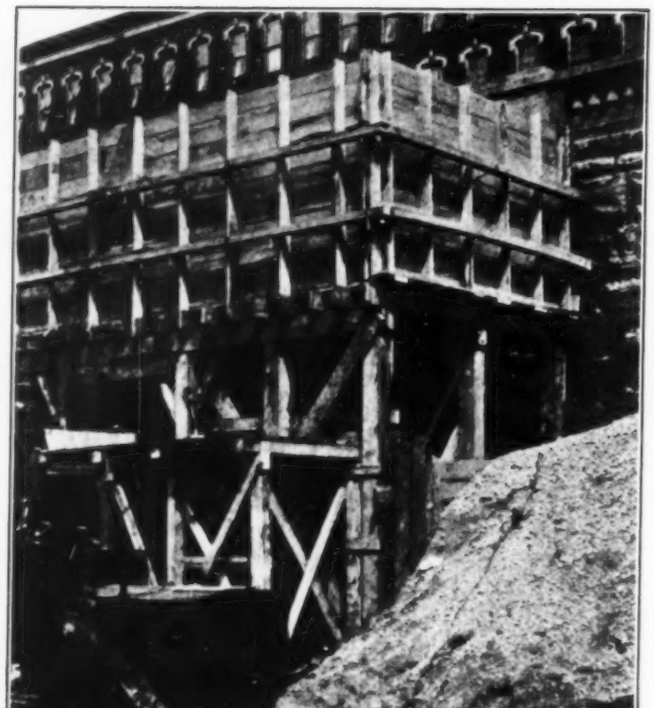
POURING THE 17-IN. SLAB ON TOP OF THE SUBWAY WHICH WILL GIVE ROCHESTER A NEW STREET

was placed in overhead bins and from there loaded into batch box cars running on industrial track and sent back through the canal bed to the mixer. The mixer itself was mounted on wheels so that it could be easily moved, and was equipped with a 60-ft. tower and chute.



THE CRUSHING PLANT SAND BINS AND CEMENT HOUSE AT THE WEST END OF THE SUBWAY. THE CEMENT IS BROUGHT IN CARS ON THE RAILROAD TRACK AT THE RIGHT

By the use of a counterweight it was possible to use 80 ft. of chute so that from its position a few feet from one side of the canal, the plant can pour both side walls and the top slab. This combination of truck haul to the crusher, industrial track to the mixer, plus tower and chute, is a rather unusual one. At the point where the mixer is working there is plenty of room for all three lines of traffic, mixer, industrial track and motor trucks. The plan has worked out well thus far and will be continued throughout this season.



BIN AT EAST END WHICH WILL BE FILLED FROM STREET LEVEL

A slightly different method is to be used for a section of about 800 ft. at the east end of the job. A big bin, which is shown in the photograph on this page has been put up in a very favorable position close to a high retaining wall on top of which is one of the city streets, and a mixing plant will be established at that point. The gravel for this bin will be brought from the crusher in motor trucks through the city streets and then dumped in from the top of the wall. Industrial cars carrying one 1-yd. buckets will then take the concrete to where is will be used. The work from the east end is just about to begin and from now on the job will be carried on from both ends so that the two plants will finally meet.

The two trains of batch boxes which supply the mixer consist of 6 cars each. Arrangements have been made to load them at the crushing plant in such a way that all the gate arms on the gravel bins will move at the same moment, thus loading the six gravel compartments simultaneously. The same method will apply to the loading of sand and cement and very little time will be lost at the bins.

The firm of Scott Bros., which is doing the work, consists of Robert G. Scott, William E. Scott and James P. Scott. The construction engineer in charge is H. O. Bagley. Directly in charge for the city is John A. O'Connor who was recently appointed Engineer of Subways to succeed LeGrand Brown, who died. C. Arthur Poole is City Engineer.

The magnitude of the work may be judged by the fact that 1,500,000 lb. of structural steel are being used, about 3,500,000 lb. of steel reinforcing, and about 40,000 yd. of concrete are to be poured.

CARING FOR ROADS DURING SPRING BREAK-UP

A PAMPHLET has just been issued by Ben H. Petty, Assistant Professor of Highway Engineering at Purdue University, in which is printed a talk on the care of roads during the spring break-up, which was recently broadcast from the Purdue Radio Station. Because this was a radio talk Professor Petty had to compress a great deal of useful information into a comparatively few words and he succeeded admirably.

After saying with considerabe emphasis that the one and only cause of the break-up of roads in the spring is "TOO MUCH WATER" he goes thoroughly into the reasons why too much water does so much damage to the roads. He is a great believer in road maintenance at all seasons of the year and what he says on this point will be interesting to those readers of SUCCESSFUL METHODS who are concerned with the maintenance of roads.

"From a consideration of the above facts it is quite evident that a considerable part of the work undertaken to improve our roads during the spring break-up should be started the preceding fall. Drainage is the first consideration. The road surface should be kept smooth and crowned about one-half inch to the foot so as to shed the rainfall to the side ditches and not permit it to stand on the surface and soak in. The careful use of a road grader or good drag of the type used by the State Highway Maintenance Department will accomplish this result. In dragging, care should be taken not to form a secondary ditch on the shoulder which will prevent the surface water flowing off into the side ditches. Adequate ditches should be provided along each side of the road to proper grade so that they will not only collect the water which runs off the road, but will quickly carry it away. Too many so-called side ditches are merely collecting basins which catch the water running off the surface of the road and hold it alongside until it can soak down under the road and soften up the roadbed. This type is worse than no ditch at all. The patrolman should make it his last duty, just prior to the winter freeze-up, to see that all side ditches are cleaned out properly, and that all culverts are free from obstructions so that the water can drain away from the road as quickly as possible.

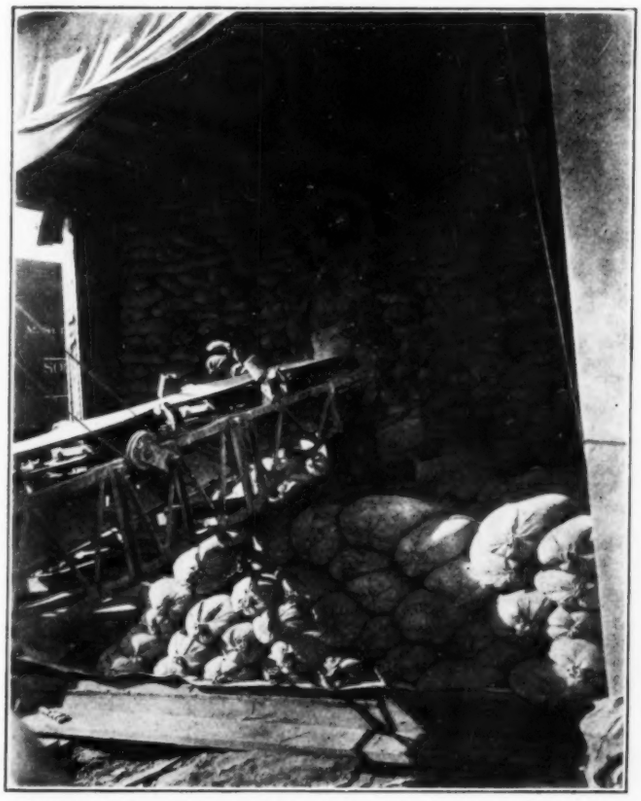
"During the winter the grader or drag should be used after each snowfall to remove the snow from the road surface before it has opportunity to melt and soften the road. This gives the sun and wind free play in drying and keeping dry the surface. From time to time during the winter the temperature will rise sufficiently to eliminate the frost from the upper inch or two of the road surface. The patrolman should immediately grasp this opportunity to go on the road with the grader or drag."

STORING CEMENT IN ADVANCE

Belt Conveyor Speeds Up Work and Cuts Cost of Preparing for Road Job

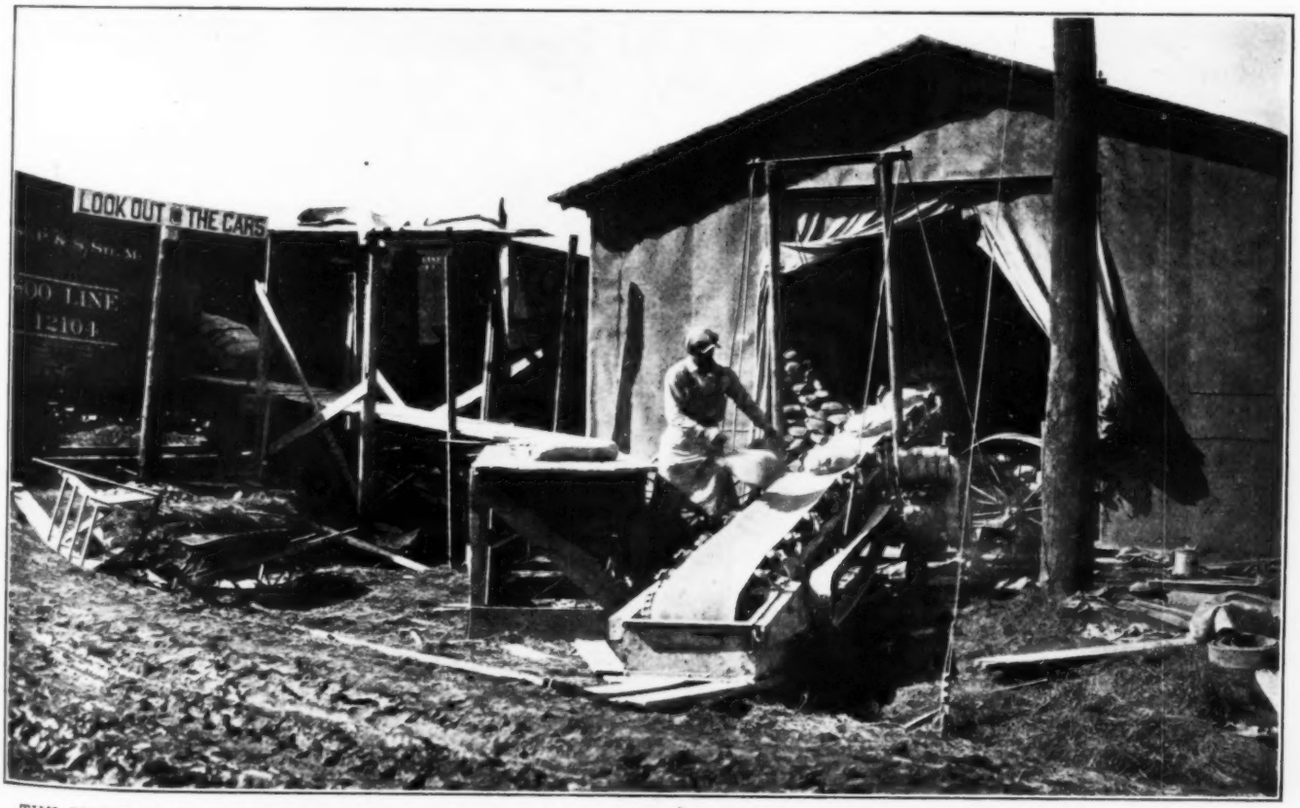
A GOOD example of the economies that can be effected by storing cement for a road job in advance is furnished by the White Construction Company which is building a 7½-mile concrete pavement at Prairie View, Lake County, Illinois. The method used is shown in the photographs on this page.

The cement was brought from the cars down a short inclined platform in hand trucks, 2 men doing this part of the work. At this point another man transferred the sacks from the platform to a belt conveyor which carried them into the shed. The hopper end of the conveyor was kept lower than the platform. By adjusting the height of the discharge end of the conveyor, it was possible to eliminate heavy lifting inside the shed and to pile the sacks of cement clear up to the ceiling as may be seen in the upper photograph. From Feb. 5 to March 28, 96,116 sacks were unloaded.



THE CEMENT IS PILED ALL THE WAY UP TO THE ROOF

Before the conveyor was put in, the 4 men employed on the job worked about 10 days unloading cars by hand, and it was found that by using a conveyor they could work much faster and more efficiently. On an ordinary day with a conveyor 4 cars could be unloaded containing in all 3320 sacks. The same 4 men kept on the job from start to finish. The cost of building the sheds and unloading was about 20 cents per barrel.



THE METHOD OF HANDLING THE CEMENT FROM CAR TO STORAGE IS CLEARLY SHOWN IN THIS PHOTOGRAPH

EIGHT SHAFTS SPEED TUNNEL JOB

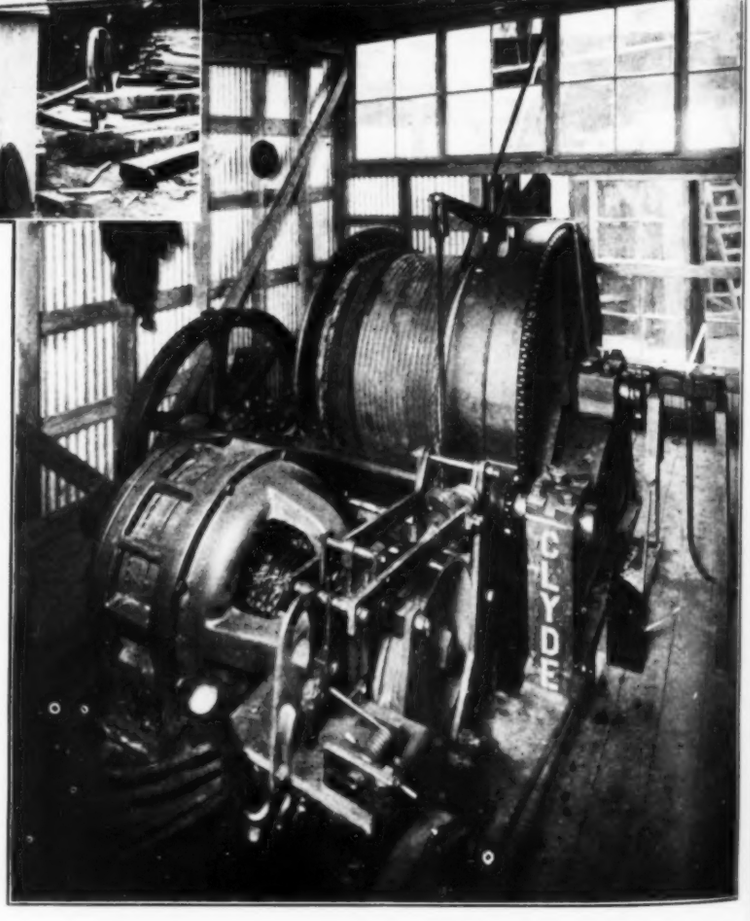
Hoists Equipped with Limit Switches Insure Safety During Boring of New York-New Jersey Tubes

WORK is going ahead quite satisfactorily on the vehicular tunnel under the Hudson River from New York City to Jersey City. Some of the general features of this great project were described in SUCCESSFUL METHODS of last February. As mentioned in that description, various special methods have been developed to meet the unprecedented problems presented by the great size of the twin bores and the bad soil conditions encountered. The contractors, Booth & Flinn, also have drawn on the long and varied experience of their entire organization in the selection and adaptation of plant and equipment to meet these problems.

Some of the keenest planning on the project has been required in the construction and equipment of the eight shafts through which operations will be conducted. Inland about 350 ft. from the bulkhead line on each of the two approaches on the New York side is a so-called land shaft. Both of these have been sunk through waterbearing old fill, silt and gravel to and into the rock. At the outer pier line on the New York side there is one shaft for the two tunnels. On the New Jersey side the two pier-end shafts are about 1400 ft. from the shore. The land shafts on the New Jersey side are separate and inland about 50 ft. from the bulkhead line.

The two land shafts on both sides of the river are completed and in use. The caisson for one pier head shaft on the New York side is being sunk and the caissons for the New Jersey side will be placed shortly.

Spoil from the headings will be removed and construction materials taken in through these several shafts. Double cage counterbalanced elevators operating in structural head houses serve each shaft. Each pair of cages is handled by a standard single-drum electrically driven hoist on which the contractors have standardized for this service.



One of the photographs shows the headhouse of the south approach land shaft on the New York side. The hoist is located in the small corrugated iron building in the foreground of this picture. It was placed on a heavy concrete footing on the ground instead of on the headhouse, in order to reduce the load on the latter and also to secure an absolutely firm foundation.

The accompanying interior view of the hoist house shows the manner in which the hoist is equipped. Directly back of the motor is a control box, not shown in the photograph, by means of which the hoist is manually operated. Two methods of braking are provided. The regular friction brake on the hoist drum is operated by a hand lever shown in the left foreground. The shaft of the motor also is extended to carry a brake wheel. A solenoid operated brake works on this wheel. This brake comes into action automatically when the operator shuts off the power with the controller.

In order to avoid all chance of accident due to overrunning of cages, each hoist is equipped with a limit switch as shown by an arrow in the photograph. This switch is gear driven by the hoist drum shaft. It is set so that, if for any reason the cage overruns more than 2 ft., the switch opens a circuit breaker that cuts off the power and the automatic solenoid brake stops the hoist instantly.

One of these hoists has been in continuous service on three eight-hour shifts six days a week for one month. During that period the automatic control has never failed to function once. The hoist also has required no attention except lubrication. The contractors, therefore, anticipate that the several shaft hoists will go through the entire job without a hitch. These hoists are merely examples of the sort of equipment which have been specially selected and adapted to meet the very arduous conditions presented. They are a good example of the value of sturdy, well-designed equipment on any job.

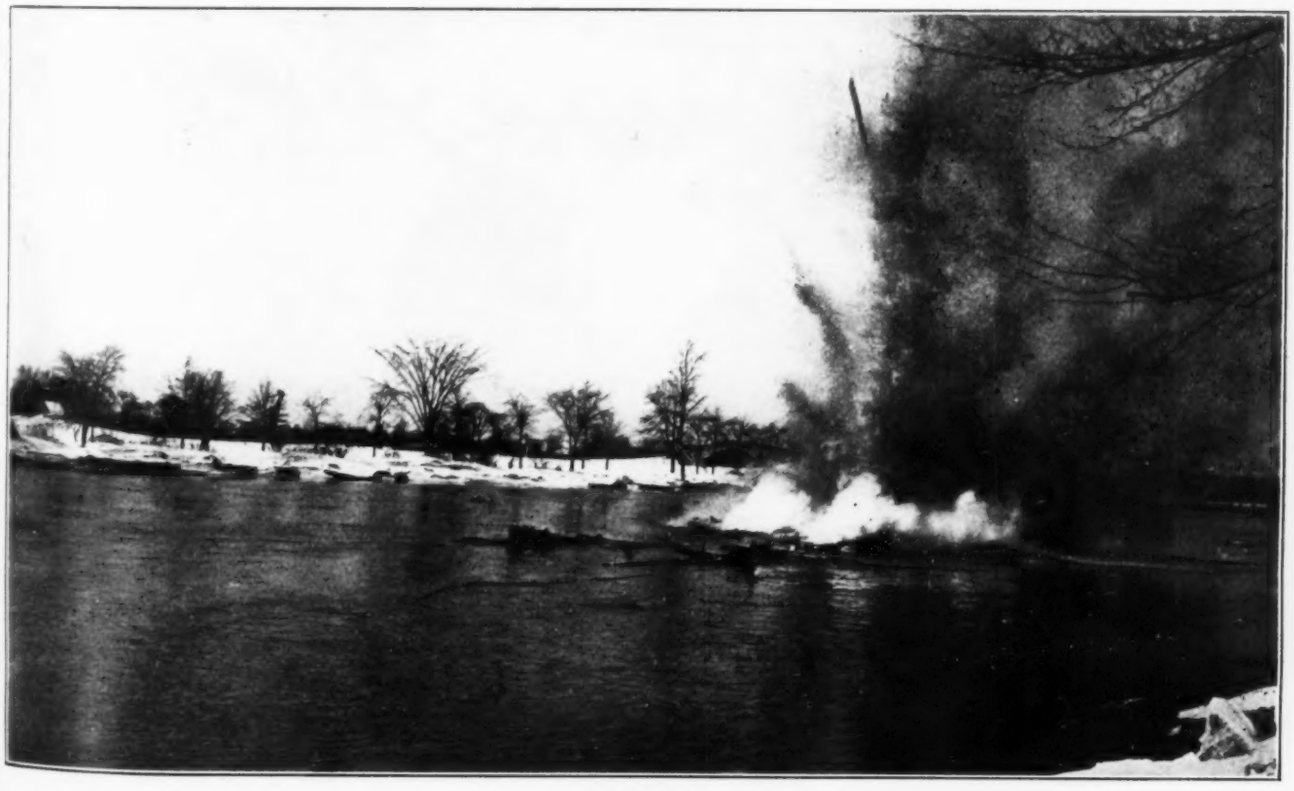
A. Hjort, electrical and mechanical engineer for Booth & Flinn, has general charge of the selection and operation of the equipment used by the contractors on the project.

The New York-New Jersey Vehicular Tunnel is being built under the supervision of the New York State Bridge and Tunnel Commission and the New Jersey Interstate Bridge and Tunnel Commission, C. M. Holland is serving as Chief Engineer for both of the commissions.

CONTRACTOR CALLED IN TO BLOW UP GRAIN BARGE

A CONTRACTOR, in order to live up to his name, has to do all sorts of unusual jobs and the photograph below shows one of them. A barge loaded with grain broke from its moorings in the Genesee River near Rochester, N. Y., and was forced down the river by the ice. As it was important to destroy it before any further damage was done, James Stewart & Co. of New York was called in and asked to undertake the work of getting rid of the barge.

The boat first was made fast to the shore by hawsers and then 200 lb. of 40 per cent gelatin dynamite was used to blow it to pieces. One end of the boat was blown up first and the other later in order not to have too much material flying through the air at one time.



COMBINING TRUCK AND INDUSTRIAL HAULAGE

How These Methods Are Used in Building Pennsylvania Concrete Roads

By Crosby Tappan,
Formerly Supt. of Construction, Pennsylvania State Highway Dept.

WHERE materials are received at one end of a job and where the job is more than 3 miles long, the combined use of industrial railway haulage and trucks will be found of advantage and should be carefully considered.

The ordinary scheme is to haul concrete materials in trucks from the unloading point and either stock in piles adjacent to the road or else dump directly into the mixer. When the trucks dump directly into the mixer, usually the grading and bridges must be complete before concreting can start. Often when material is hauled to stock piles, most of the grading must be finished before paving commences.

By the transfer system, batch boxes are hauled on trucks to the unloading point and there filled with proper quantities of sand, stone and cement. The trucks then deliver the batch boxes to the transfer station where the batch boxes are transferred to narrow-gage railroad trucks. Hence, the boxes are hauled to the mixer and emptied, then returned to the loading place by the reverse of above method.

The equipment required at the transfer point includes a truck, turn-table and a light portable crane or derrick. The turntable can be home-made at a cost of less than $500. One job where this method was successfully used had two transfer points. A home-made table like the one shown in the illustration was used. At one point a home-made stiff-leg derrick mounted on a truck tractor did the transferring of the boxes. Power was obtained from a gas engine. At the other transfer station a portable gas driven crane with a 20-ft. boom was used. The crane was a standard make.

The total force required at a transfer point was four, comprising an operator for the derrick and 3 men to hook and unhook the batch boxes and to

TRANSFERRING BATCH BOXES FROM TRUCKS TO INDUSTRIAL CARS

swing the derrick boom. One of the three last mentioned is the foreman in charge of the transfer. One other man is needed to turn the turn-table.

The transfer point is located as near the mixer as the age of the concrete will permit. In Pennsylvania, 21 days must elapse before the concrete can be used, so that the transfer must be 1 to 2 miles behind the mixer. It was found best to move the transfer ahead about once a week. Usually it can be moved during a wet spell or when concreting is delayed for any reason. When the turntable is moved it is jacked up and rollers placed under the frame supporting the circular rail. A steam roller or truck then pulls it ahead. As the derricks were both portable, they were easily moved. The transfer can be moved 1 mile and set up ready for operation in 5 hours.

HOME-MADE TURNTABLE FOR TRUCKS CARRYING BATCH BOXES

At the loading plant a good arrangement consists of two parallel side tracks, on one of which is operated a locomotive crane with a 50-ft. boom and a clamshell bucket. Such a crane will unload 12 cars of sand or stone in a 10-hour day. Two bins, one for stone and one for sand, and a cement shanty of at least 10-car capacity complete the equipment.

One of the photographs shows such an unloading plant. On this job, 10 miles of concrete road were laid in one season. The bins hold about 100 tons each and are high enough in the air to permit the trucks to pass under them. The average number of feet of 18-ft. pavement laid per working day on this job was 365, or 730

MATERIAL YARD WHERE BATCH BOXES LOADED ON TRUCKS ARE FILLED WITH SAND, STONE AND CEMENT

sq. yd. The haul was uphill for 6½ miles with long stretches of 6 per cent grades. Three miles of narrow-gage track with switches and turnouts, 40 batch box trucks and four 6-ton dinkies are sufficient railway equipment.

The number of trucks needed varies with the length of haul and capacity of trucks. On work covering the construction of 22⅓ miles of pavement in one season with the average haul (for trucks) 5.6 miles, it was found that a truck in a 10-hour day could average 56 miles per day. The highest average mileage during any month was in October when the daily average was 80 miles. Of course, the longer the haul the greater the daily mileage as the lost time at each end bears a lower ratio to the total time of each round trip. With good truck mechanics and proper supervision 80 per cent of the trucks were at work at all times.

A few costs may be of interest. These figures are for haul of material for one square yard of 7-in. concrete pavement from yard to mixer, including cost of transferring from trucks to narrow gage. They are figures on 22 miles of road. The average haul, combined truck and narrow gage, was 6.75 miles. The average cost of hauling materials for 1 sq. yd. of pavement 1 mile was 22.16 cents. Deducting plant rental charges but including all labor, repairs, and fuel, the cost per mile was 13.0 cents. The cost of gas and oil per mile for hauling materials for 1 sq. yd. was 4.2 cents.

Note.—The haul given above is one-way. The trucks and trains returned empty from the mixer.

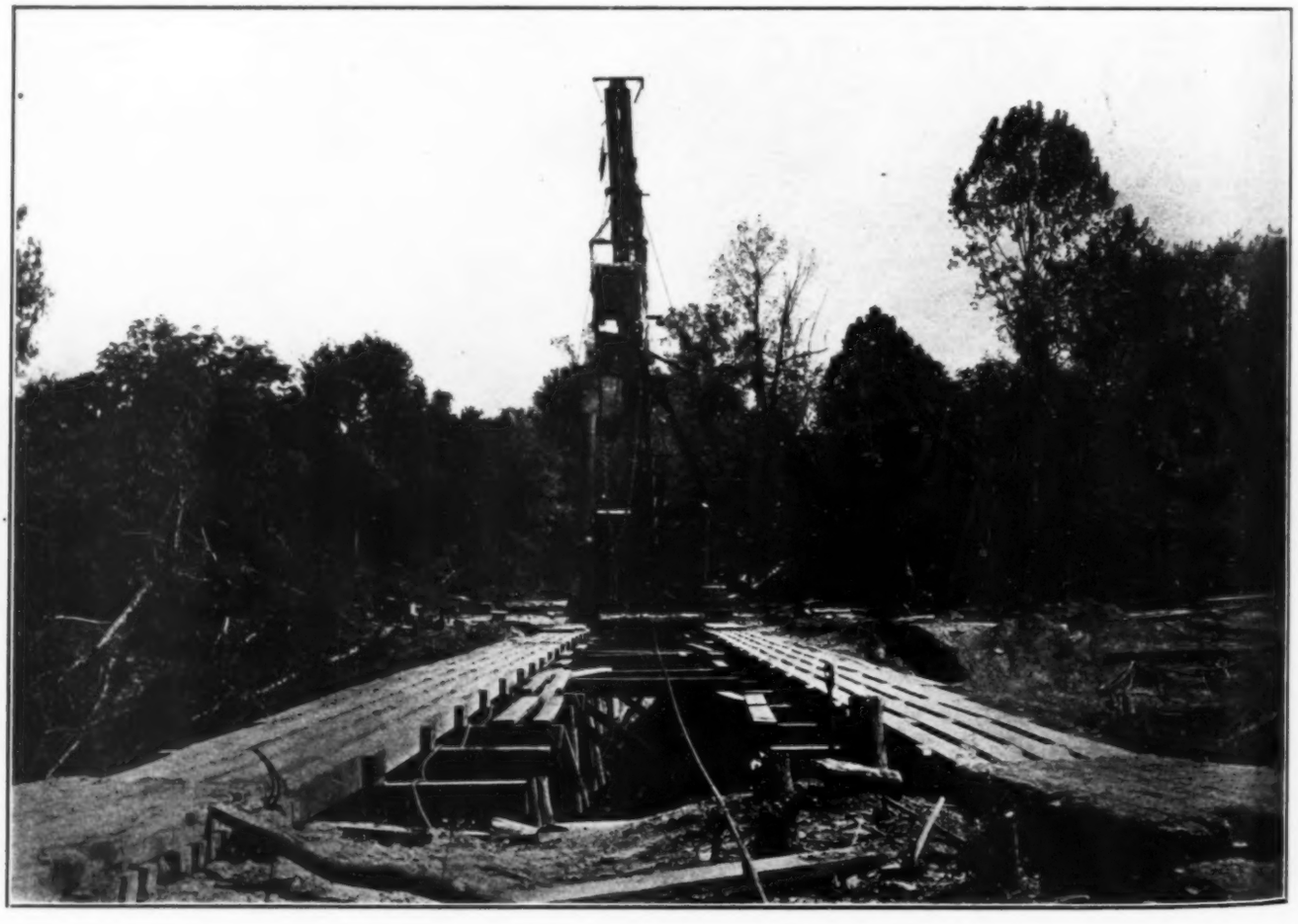
SPECIAL BRIDGE FOR HEAVY MACHINE

MOVING heavy machinery often is a considerable problem to the contractor, and the illustration at the bottom of this page shows the amount of work that was necessary in order to get a big dragline excavator across a bayou 200 ft. wide and 35 ft. deep near Gillette, Ark.

The bridge shown in the photograph was made to order for the purpose of getting the excavator across. The machine had completed its work on about 20 miles of levee embankment for the Farelly Lake Levee District and was on its way to another job.

After the excavator was across it was found that the bridge could be put to other uses and one-half of it now is used as a wagon road, while the other half carries a standard-gage railroad that runs from Gillette to the site of the flood gate which is now being built and which involves a large volume of excavation by the machine shown in the photograph.

The contractor who devised this method of getting heavy machinery across the bayou and then of putting the bridge to further use is Reeve H. Hutchison of Gillette.

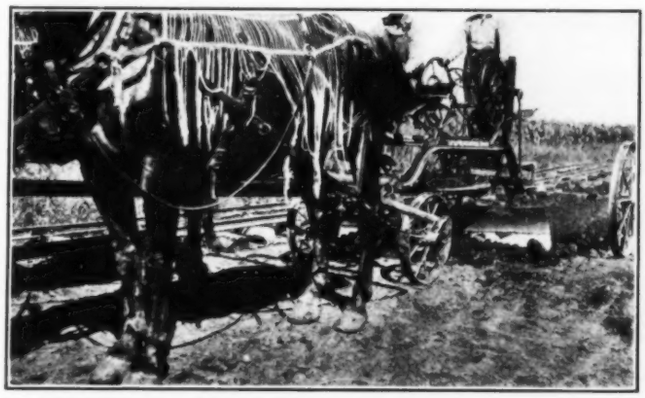


THE BLADE GRADER AS A MAINTENANCE TOOL

Minnesota Patrolmen Find These Machines Efficient Aids in Taking Care of Roads

By C. P. Burton

NOT long ago the American method was to build a road and then let it go to pieces, or at best to let it disintegrate to such an extent that heavy and expensive blade machines had to be used to make it somewhere near passable. This stage in our road-building development has nearly passed, and the States gradually are adopting the patrol system of intensive maintenance as the best solution of the good-roads problem.



USING A 6-FT. BLADE IN PREPARING THE SUBGRADE

Under the patrol system of making one man responsible for the maintenance of a certain mileage of roads and requiring him to keep eternally after it, the small blade machines are proving very effective maintenance tools. There are one-man, one-team graders, with 5-ft. or 6-ft. blades, which are just as flexible in operation as are the larger machines. There are also some blade graders adapted for use with small tractors which are very efficient in road maintenance.

The illustrations show Jim Brogan, Patrolman, at Rochester, Minn., at work with a one-man, one-team machine. His section comprises nine miles of group 20, southeast of Rochester. Under the State Highway Maintenance Department there are approximately 1000 patrolmen. Some of them use these small machines, others, a somewhat heavier grader, depending upon soil conditions. Constant work with these, or similar machines, is the price of good road maintenance. Minnesota spends more than $3,000,000 a year in maintenance, which includes graveling with State forces, using tractors and trucks obtained from the United States War Department.

JIM BROGAN, PATROLMAN, FINDS THIS MACHINE HIS STAUNCHEST ALLY IN KEEPING HIS NINE MILES OF ROAD UP TO THE MARK

CONTRACTOR RUNS HIS OWN MILL IN SLACK SEASON

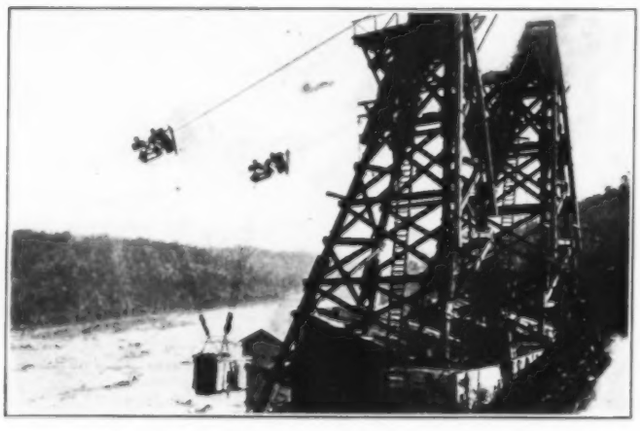
THE illustration shows one of the many handsome residences built on the large estates near New York City. The design of this class of building calls for special work on the part of the contractor, the mill work, tile and masonry work in nearly all cases being unusual. To handle this type of construction

work, and to insure an uninterrupted service on the special work, Frank N. Goble, general contractor of White Plains, N. Y., has for some time been operating his own mill and paint shop and carries a stock of 200,000 ft. of lumber. Specials to fit the architect's design are turned out, and in the slack season standard sash and other mill work, such as mouldings, are made.

This is one more illustration of how contractors may adapt their plants and organizations to fit local and specialized conditions. By means of the mill and the other activities the contractor is able to take care of his overhead and field forces during the off-season slack period.

CABLEWAY CARRIES SHOVEL

ONE of the many uses to which a cableway can be put on a big construction job is illustrated by the accompanying photograph which was taken by one of the engineers on the Mitchell Dam which is being built by the Dixie Construction Company near Birmingham, Ala. The construction of this dam was described in the March issue of SUCCESSFUL METHODS.



In the photograph the cableway is shown lifting the cab of a steam shovel with all the machinery in it out of the excavation. It is about to be deposited upon a flat car for shipment.

This particular cableway had a span of 1530 ft., the sag allowed being 80 ft. The diameter of the lock wire of the main cable was 2¼ in. The diameter of the main hoist rope was ¾ in. The height of the head tower was 85 ft. and of the tail tower 64 ft. These cableways carried 6 to 10 ton loads at a speed of 250 to 300 ft. per minute for hoisting loads and 1200 ft. per minute for loads along the cable.

HOUSES ON STILTS

THE house on stilts shown in the accompanying photograph is one of the type which is being built on the upper part of Manhattan Island in New York City. The land is so valuable that it has to be utilized

even though because of its rocky and precipitous nature it is totally unsuited to the building of apartment houses and the method of support shown in the photograph has been adopted.

TURNING THE TABLES

THE Highway Department of the State of Nevada recently received a letter from a motorist in which he requested that the State pay for the damages to his car which resulted from striking the iron pipe guard rail on a culvert with the consequent ditching of his car. An investigation by the Department showed that at the point where the accident occurred the road was 24 ft. wide, the culvert being the same width with concrete head walls protected by iron pipe railings. At this point the highway is straight with no curves to conceal the culvert. When last heard from, the Nevada officials were seriously considering the proposition of presenting bill for repairing the culvert to the motorist who had demanded damages for the injury to his car.

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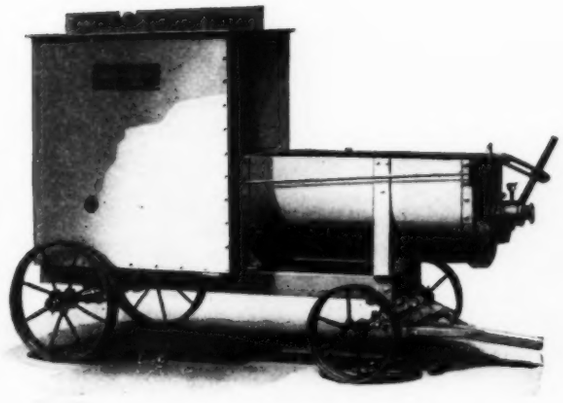
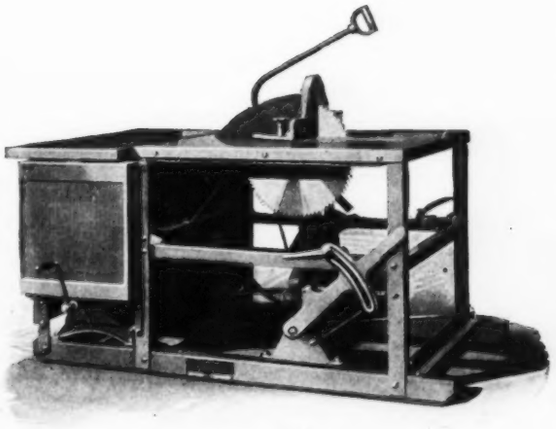
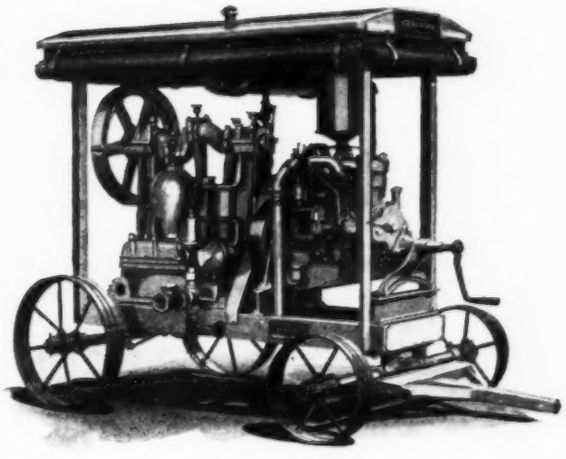


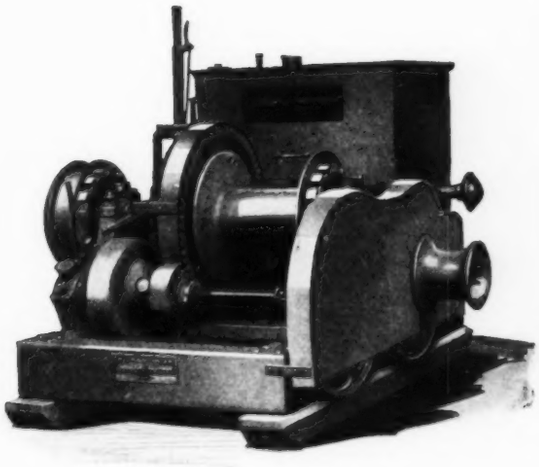
No. 1—Mortar Mixer



No. 15—Saw Rig



No. 9—Triplex Pump



No. 14—Reversible Hoist

Send for complete catalog just off the press. Do it now.

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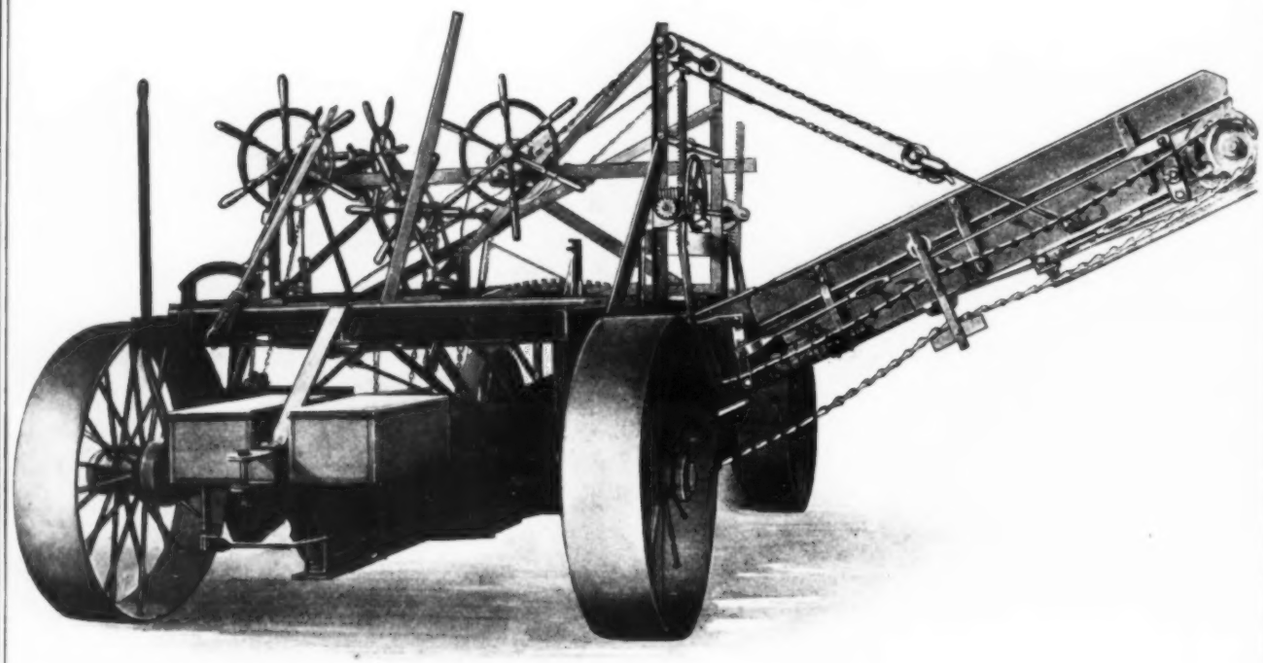
Here it is—Western 1923 Model



This new model elevating grader is going to revolutionize machine work.

The well known Western Machine has been redesigned to meet the new problems of heavy tractor operation. Every improvement was passed upon and "O-Kayed." by one of the most expert operators in the country, who spent days at the Western factory for the purpose.

New elevator throughout, new hitch, improved disc, improved front bolster, strengthened frame, simplified adjustments.

The elevating grader you have been looking for.

Send for our new catalog of Contractors' Equipment, explaining each improvement in detail—S-57.

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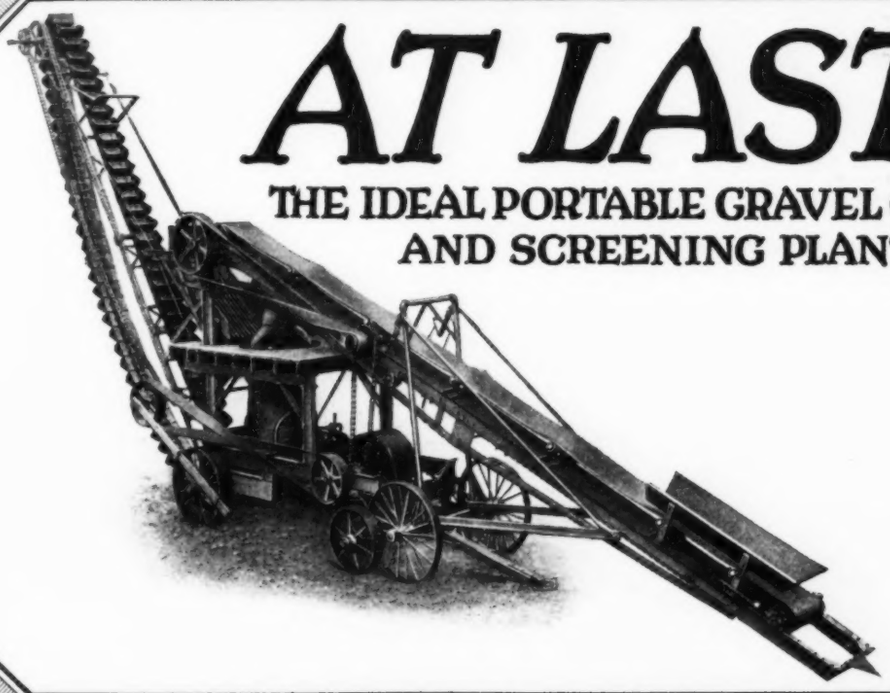

AT LAST!

THE IDEAL PORTABLE GRAVEL CRUSHING AND SCREENING PLANT

GRAVEL is brought from the pit in wagons, drags or fresnos, and dumped through a trap directly upon the conveyor, which in turn deposits the material upon a grizzly screen. The undersized material drops through the bars of the grizzly upon a chute leading directly to the elevator, while the oversize rolls down the bars into the crusher.

Nos. 2, 3 and 4 Austin Gyratory Crushers can be mounted on trucks and furnished with rigid or folding elevators of the required lengths, and gravel conveyors ranging in length from 30 feet to 50 feet. Optional equipment includes a revolving screen mounted on a portable bin.

While moving from place to place, the elevator folds down over the crusher; the conveyor is disconnected from the crusher, and its lower end attached to a truck or wagon.

A special bulletin describing these portable plants in detail is just off the press. We would like to send you a copy. Ask for Portable Gyratory Crusher Bulletin "X"

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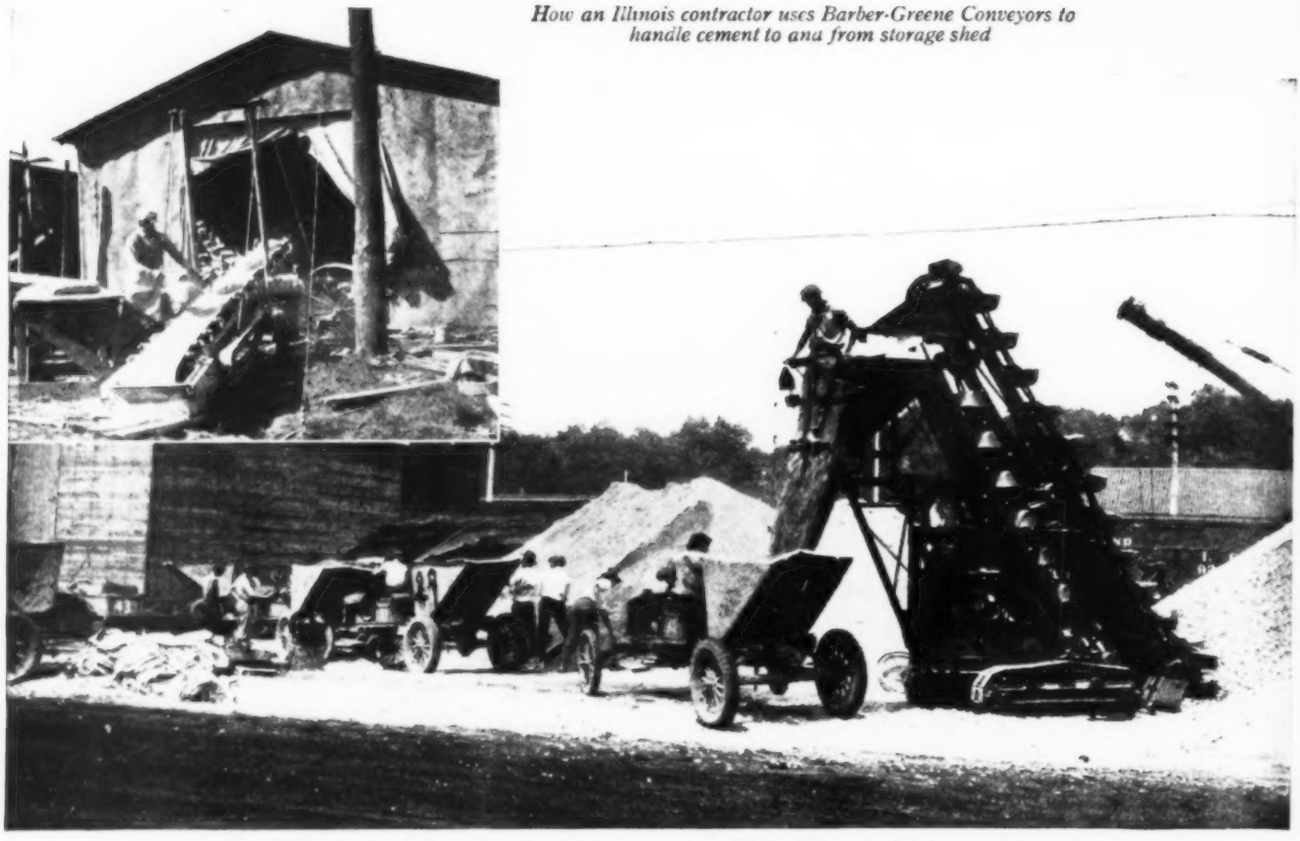
How an Illinois contractor uses Barber-Greene Conveyors to handle cement to and from storage shed



Barber-Greene Bucket Loader reclaiming from storage without the help of "clean-up" shovelers

Stockpiling promises unusual profits this year

It does not seem likely that the supply of road-building materials will be steady and ample this summer. The labor and railroad situations both forecast more than the usual irregularities of delivery in all lines.

Stockpiling will therefore be more profitable than ever before — but the stockpiling must also be on a larger scale than ever before because of the exceptional shortage of men.

A large contractor in Illinois who last year used four Barber-Greene Bucket Loaders for storing and reclaiming has just ordered six more. He plans to provide ample storage on jobs where he formerly relied on other methods to prevent shut downs due to failures of material supply.

A smaller contractor recently wrote us that he had become converted to the Barber-Greene methods of storing and reclaiming from stock piles by checking up his last year's records.

He handled stone and cement by trucks direct from railroad cars.

His shut-downs due to shortage of these three materials aggregated 46 days. In addition there were shut-downs aggregating 5 days, directly due to the use of a bin.

These delays have convinced him absolutely of the merit of the stock-pile methods using Barber-Greenes—such as these described in our free book "Results on Road Jobs."

Send the Coupon

Bin capacities are always decidedly limited, and when stock piles are expanded the crane cannot reach far enough for efficient reclaiming. Over 200 contractors have found that with Barber-Greene Bucket Loaders and Conveyors both storage and reclaiming can be handled at a great saving.

They make unlimited storage possible and reclaim more cleanly than hand shovelers—and at a great saving of men, time, and money.

Send the coupon for additional information.

BARBER-GREENE COMPANY, Aurora, Ill.

BARBER-GREENE COMPANY, 530 W. Park Ave., Aurora, Ill.
Without obligation on my part send me the literature that I have marked with a cross:

- ☐ Barber-Greene Conveyor Catalog.
- ☐ Specifications of Barber-Greene Bucket Loader.
- ☐ Cost reports showing economy of Barber-Greene Equipment.
- ☐ "Results on Road Jobs" showing layouts and performance records of contractors using Barber-Greene Equipment.

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